introducing a fluorocarbon gas alone into the reaction chamber, wherein the fluorocarbon gas is composed of at least one of C_4F_6, C_5F_8, and C_6F_6 gases; and

creating a plasma from the fluorocarbon gas and etching the silicon dioxide film with the plasma,

wherein a residence time τ of the fluorocarbon gas in the reaction chamber is controlled at a value greater than 0.1 sec and equal to or less than 1 sec, the residence time τ being given by P x V/Q, where P is a pressure (unit: Pa) of the fluorocarbon gas, V is a volume (unit: L) of the reaction chamber and Q is a flow rate (unit: Pa · L/sec) of the fluorocarbon gas.

4. (Twice Amended) A plasma processing method comprising the steps of:

placing a substrate inside a reaction chamber of a plasma processing system, a silicon dioxide film having been formed on the surface of the substrate;

introducing a fluorocarbon gas alone into the reaction chamber, wherein the fluorocarbon gas is composed of at least one of C_4F_6, C_5F_8, and C_6F_6 gases; and

creating a plasma from the fluorocarbon gas and etching the silicon dioxide film with the plasma,

wherein PxW_0/Q is controlled at a value greater than $0.8x10^4$ sec·W/m^3 and equal to or less than $8x10^4$ sec·W/m^3, PxW_0/Q being a product of a residence time τ of the fluorocarbon gas in the reaction chamber and a power density Pi of power applied to create the plasma, the residence time τ being given by PxV/Q, where P is a pressure (unit: Pa) of the fluorocarbon gas, V is a volume (unit: Pa · L/sec) of the fluorocarbon gas, the power density Pi being given by W_0/V, where W_0 is a magnitude (unit: W) of the power and V is the volume (unit: L) of the reaction chamber.

7. (Twice Amended) A plasma processing method comprising the steps of:

placing a substrate inside a reaction chamber of a plasma processing system;

introducing a fluorocarbon gas into the reaction chamber, wherein the fluorocarbon gas is composed of at least one of C_4F_6 and C_5F_8 gases; and

creating a plasma from the fluorocarbon gas and depositing an organic film on the substrate using the plasma,

wherein a residence time τ of the fluorocarbon gas is controlled at 0.1 sec or less, the residence time τ being given by PxV/Q, where P is a pressure (unit: Pa) of the fluorocarbon gas, V is a volume (unit: L) of the reaction chamber and Q is a flow rate (unit: Pa · L/sec) of the fluorocarbon gas.

10. (Twice Amended) A plasma processing method comprising the steps of:

placing a substrate inside a reaction chamber of a plasma processing system;

introducing a fluorocarbon gas into the reaction chamber, wherein the fluorocarbon gas is composed of at least one of C_4F_6 and C_5F_8 gases; and

creating a plasma from the fluorocarbon gas and depositing an organic film on the substrate using the plasma,

wherein PxW_0/Q is controlled at $0.8x10^4$ sec · W/m^3 or less, PxW_0/Q being a product of a residence time τ of the fluorocarbon gas and a power density of Pi of power applied to create the plasma, the residence time τ being given by PxV/Q, where P is a pressure (unit: Pa) of the fluorocarbon gas, V is a volume (unit: L) of the reaction chamber and Q is a flow rate (unit: Pa·L/sec) of the fluorocarbon gas, the power density Pi being given W_0/V, where W_0 is a magnitude (unit: W) of the power and V is the volume (unit: L) of the reaction chamber.